

MARKED UP COPIES OF CLAIMS CHANGED BY THIS AMENDMENT

26 (Amended) A method of monitoring refrigeration equipment having a compressor, a condenser, an evaporator and a refrigeration chamber comprising:

- (a) continuously sensing the values of selected operating parameters of the refrigeration equipment; and
- (b) performing equipment checks on the sensed values to identify existing or incipient problems with the refrigeration equipment;

wherein:

~~the sensed values of at least one of the operating parameters are periodically sampled and recorded repeatedly in a computer database to produce a time series of the recent history of said operating parameter at regular intervals and the sampled values are inserted into a database to maintain a time series of the recent history of each operating parameter, each time series comprising more than one pair of values, each pair of values comprising the sampled value of an operating parameter and a value representing the point in time at which the sample was sensed;~~

and

~~at least one of the equipment checks is performed using the stored time series of sensed values of operating parameters the refrigeration equipment is actively monitored for existing or incipient equipment problems by repeatedly retrieving the entire stored time series of the recent history of one or more operating parameters and tracking the trend of each said operating parameter by examining the interrelationship over time of values from each of the time series so retrieved from the database.~~

31 (Amended) Apparatus for monitoring refrigeration equipment having a compressor, a condenser, an evaporator and a refrigeration chamber comprising:

- (a) one or more sensors for continuously sensing the values of selected operating parameters of the refrigeration equipment; and
- (b) a processor monitor for performing equipment checks on the sensed values to identify existing or incipient problems with the refrigeration equipment;

wherein:

the sensed values of at least one of the operating parameters are periodically sampled and recorded repeatedly in a computer database to produce a time series of the recent history of said operating parameter at regular intervals and the sampled values are inserted into a database to maintain a time series of the recent history of each operating parameter, each time series comprising more than one pair of values, each pair of values comprising the sampled value of an operating parameter and a value representing the point in time at which the sample was sensed;

and

at least one of the equipment checks is performed using the stored time series of sensed values of operating parameters the monitor actively monitors the refrigeration equipment for existing or incipient equipment problems by repeatedly retrieving the entire stored time series of the recent history of one or more operating parameters and tracking the trend of each said operating parameter by examining the interrelationship over time of values from each of the time series so retrieved from the database.

REMARKS

1. Claim rejections per 35 USC §102

Further to telephone discussions with the Examiner of September 23 and 28, 2005, this paper provides an amendment to claims 26 and 31 to avoid being anticipated by the disclosure in Gras (US patent 4,787,213). It is submitted that the amended claims continue to be fully supported by the disclosure.

In particular the claims now claim the storage of sensed values repeatedly in a database for use in the analysis of existing and incipient equipment problems by using an active monitor to track the trend of selected operating parameters.

Regarding claims 26 and 31:

The amended claims 26 and 31 require that there be a database in which sensed values of operating parameters and corresponding time values are repeatedly stored. These comprise the historical record for the selected operating parameters which are used to check for equipment problems. It is submitted that Gras in Fig. 2, units 100-105 does not disclose the storage of this sort of information. Further, the logic of Fig. 2 relies solely on only five data – a defrost signal (on or off), an indicator whether the compressor is running or not, T_E , T_A and T_{Dsoll} . At no point is there an examination of the recent history of any of these parameters. The logic is controlled solely by the latest values of these five parameters.

Regarding claims 27 and 32:

Gras (col 2-3, lines 28-5) discloses an improved method of controlling the expansion valve “*after an extended stoppage of a refrigeration system*” (col 2, lines 35-36 and again at col 2, line 50). It is submitted that the special type of operation contemplated here is designed to avoid excessive work by the compressor after a long period of idleness – “*If the refrigerating system is now put into operation the motor which drives the compressor must perform considerable compression work ...*” (Gras, col 2, lines 39-42). The disclosure in the subject application regarding the long compressor off-cycle deals with an entirely different situation. In normal operation, refrigeration compressors cycle on and off. Such compressors only do enough work needed to cool the refrigeration chamber adequately and then they shut down – “*Periodically ... the compressor 106 runs to maintain or increase the pressure difference ...*” (subject application, page 20, lines 4-5). However, if the compressor is failing (or has failed entirely) the off portion of these cycles increases. It is this event which the subject refrigeration monitor seeks to check (subject applica-

tion, table (d) page 27). The distinction is highlighted by observing that the special type of operation in Gras takes place when the compressor is running after a stoppage; claims 27 and 32 in the subject application check for an equipment problem which manifests itself in an overly-long compressor off-cycle, one that occurs while the compressor is not running.

Regarding claims 27-30 and 32-35:

It is submitted that if the amended claims 26 and 31 are found to be allowable, then the dependent claims 27-30 and 32-35 are also allowable without amendment.

Applicants respectfully submit that the pending claims 26-35 are in condition for allowance and seek an early allowance thereof.

Executed at Victoria, British Columbia, Canada on October 14, 2005



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